Airport Ramp Risk Analysis at Halim Perdanakusuma

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ABSTRACT

In the last ten years, airline industry has grown rapidly and has made airport ramp or apron busy with its activities. The work time in this area is relatively short, causing the work pressure higher than other areas. It is not surprising that accidents and incidents are more potential to happen here. By identifying the hazard and risk, and then doing a risk analysis, the level of risk can be known using a qualitative method referring to the Australian/New Zealand Standard or AS/NZS 4360:2004. It is clear that the highest risks of ramp activities are noise, being struck by operational vehicles, and being squeezed by Ground Support Equipment (GSE). Meanwhile, the activities with high risk include fatigue, dust, being squeezed by hydraulic during preparation, being scratched by iron, improper body position when putting mannual GSE, being struck down by things, falling down, and getting lavatory water splashed on.

Keywords: Risk Analysis, Work Accident, Airport Ramp Area.

Introduction

In handling operational activities, airline companies are supported by related parties. One of the supporting parties is ground handling company. It has a role in aircraft handling on the ground, pursuant to AHM Annex A 2014 and IGOM 2014.

One of the ground handling companies operating at Perdanakusuma airport is PT Gapura Angkasa. This company carries out ground handling for chartered aircrafts, VVIP aircrafts, and regular aircrafts (Citylink). Special handling is needed for chartered and VVIP flights, for example coordination with related parties at the airport such as Angkasa Pura, Indonesian Air Force (TNI AU), foreign embassies, and State Secretariat. In addition, preparedness of GSE equipment from the company in the Ramp handling is needed as well.

In the last ten years, airline industry has grown rapidly and has made airport ramp or apron busy with its activities. The work time in this area is relatively short, causing the work pressure higher than other areas. It is not surprising that the potential of accidents and incidents to happen here is very high.

In order to support the aircraft handling on the ground, the readiness of ground handling company both in terms of Ground Support Equipment (GSE) and in terms of educated and skilled human resources is necessary so that accidents can be minimized.

Carrying out works at the ramp area can not be separated from various risks of work accident and health. A risk is the probability of loss or profit, a measure of loss potential which considers the size of a loss and its possibility to happen (Frank E. Bird,1996). Whereas according to Jordan (1992) a risk is a likelihood of loss or damage that really happens from the exposure of danger together with the possibility of pains and the number of people that will be exposed to its impact. In addition, a risk can also be defined as a probability of something unexpected happen in a certain period or operation cycle, having three components, namely (1) a bad thing happens, (2) the opportunity or probability for occurence, and (3) the consequences if it happens (Kolluru, et al, 1996).

Table 1 Ratings of Likelihood

Rating	*Classification*	*Remarks*
A	Almost Certain	Most frequently happens
B	Likely	Frequently happens
C	Possible	Possible to happen sometimes
D	Unlikely	Infrequently happens
E	Rare	Very infrequently happens

Source: AS/NZS 4360:2004

Whereas according to Cross (1998), a risk is the occurence possibility of something that can impact on a target. Risk is measured by the likelihood for something to happen and the consequences if it happens. Meanwhile, Fine (1971) states that a risk is measured by the likelihood of hurt, the exposure, and the consequences. In accordance with AS/NZS 4360:2004 standard, likelihood is a qualitative description of probability or frequency, whereas consequences are the effects/results from an occurence that is qualitatively or quantitatively stated, in terms of hurt, loss, or profit.

Based on the field observation, there are several occurences related to work health and accident at the ramp area.

Table 2. Ratings of Consequences

Rating	Classification	Remarks
1	Insignificant	Minor injury; minor breakage; loss of work time in days or even can be ignored.
2	Minor	Needs medical aids; loss of work time in days up to weeks.
3	Moderate	Serious but nonpermanent injury or pain; loss of work time in weeks up to months.
4	Major	Permanent disability/injury; temporary environmental damage; loss of work time in months up to years.
5	Catastrophic	Fatal/death; permanent local damage in the environment.

Source: AS/NZS 4360 : 2004 (modified)

Regarding this data, efforts are needed to minimize the risk of incident or accident at the ramp area (apron), to decrease the the level of accident experienced by passengers and officers, or breakage of the aircraft, GSE, and other facilities at the ramp area, to improve the service quality of GSE to reach the level of good service to passengers or aircraft in a safe and secure way. Efforts are also needed to assure all GSEs to be used for ramp area (apron) services in safe and secure condition (operation worthy), preventing from the breakage of aircraft and from hurting the officers. Therefore, this article focuses on analyzing the risk of accident in the ramp handling activities in the phase of GSE preparation, preparation before the arrival of aircraft and when it is on the ground. The research was

carried out from August 2014 to January 2015. The aims are to identify the risk, to evaluate the level of risk, and to control the risk of activities or works in the phase of GSE preparation and aircraft turnaround. This article is a descriptive qualitative research using a case study approach with primary data obtained through interviews and questionnaires distributed to key persons, while the secondary data used are job description, company's organization structure, company's vision dan mission and the theory on the Work Health and Safety, Risk Management and Ground Handling—especially Ramp Activities. Meanwhile, data analysis is carried out by identifying the danger and risk and then analyzing the risk. In this case, the level of risk is analyzed using a qualitative method referring to Australian or New Zealand Standard (AS/NZS 4360:2004). The criteria determination of consequence, likelihood, and risk level is obtained through questionnaires, interviews, and observations. The validity test on the obtained data is done using a triangulation comprising Source, Method, and Theory.

Results and Discussions

The handling process in the Ramp activities:

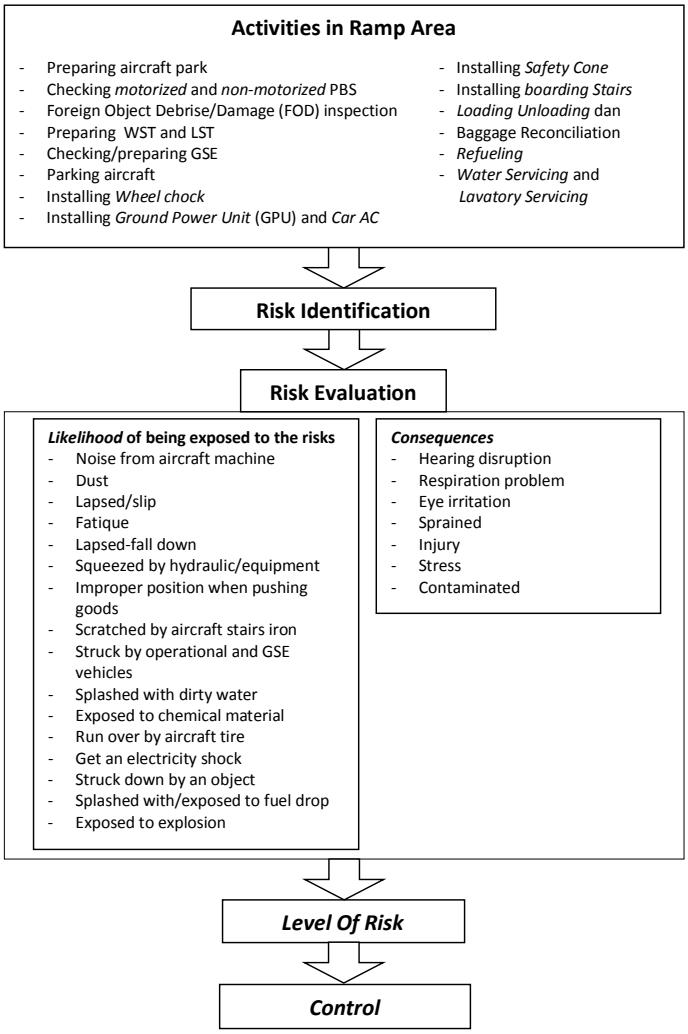

Figure 1 Framework at Ramp Area

1. Identifying the Risk in the Activities of Equipment Preparation and Aircraft Turnaround

The preparatory activities before the aircraft arrival include aircraft park preparation, Passenger Boarding Stairs (both motorized and non-motorized), Foreign Object Debrise (FOD) inspection, Water Service Truk (WST) preparation, Lavatory Service Truck (LST), and Ground Support Equipment (GSE). Turnaround activities include parking the aircraft, installing wheel chock, connecting Ground Power Unit (GPU) to the car air conditioner, installing safety cones, installing Passenger Boarding Stairs (PBS), loading-unloading process and baggage reconciliation, refuelling, water service, lavatory service, and pushback.

The risks in the activities before the aircraft arrival and during the aircraft on the ground are as follows. First, the noise may cause hearing from minor to permanent. This happens because the officer is near other aircrafts—while their machine is still on. For example, the aircrafts taking off, landing, and moving on the taxi way at the apron will produce very loud sound. This risk exists in all activities of preparing GSE, before the aircraft arrival, and when it is on the ground.

Second, dust can cause disruption in respiration and eye irritation. This happens because the officers are in an open large area allowing dust taken along with the wind, especially in the dry season, or airblast from the engine rotation makes the dust fly. Such a risk exists in all activities of preparing GSE, before the aircraft arrival and during the aircraft on the ground.

Third, slip may result in dislocation or being sprained. This happens because of slippery area due to rain, oil drop or water drop from Water Services Truck (WST) or Lavatory Service Truck (LST), as well as not wearing safety shoes to anticipate the slippery area due to the above mentioned things. The risk of being sprained exists in the activities of aircraft parking preparation, FOD inspection, WST and LST preparation, GSE preparation, safety cone instalation and refueling.

Fourth, fatique or saturation may result in hurt, injury and stress. This happens because of routines, exhaustion due to high work stress, and other factors such as weather, temperature, and excessive work hours. The risk of fatigue or saturation exists in all activities of preparing GSE, before the aircraft arrival and during the aircraft on the ground, with the exception in the activity of parking aircraft.

Fifth, slip-and-fall down may cause dislocation, scratch, injury from minor to heavy. Slip-and-fall down from a high stair for wide body may cause a fracture. Moreover, it could be fatal when the head collides. Slip-and-fall down may happen because the officers do checking in a hurry; because of disrupted concentration due to being saturated and exhausted, or slippery due to garbage, oil spot, and water puddle while installing the aircraft stair, and the officers step up the stair without

any coordination with the PBS operator. It may also happen due to low concentration during refueling that causes sprained and fall down while installing the hose.

Sixth, being squeezed in a hydraulic equipment can result in a minor to serious injury, even it can cause permanent disability. During the phase of equipment preparation this risk happens because of poor coordination between the officers who operate the hydraulic machine and the officers who are carrying out an inspection. When the aircraft is on the ground, this risk happens during the instalation of wheel chock. It occurs because the aircraft has not been in the parking position but the officer has installed the wheel chock, so that he is squeezed in the wheel. It also occurs when installing PBS. The PBS has not been in the position of adhering to the aircraft but the hydraulic has moved so that the officer on it can be squeezed. In the loading unloading activities and baggage reconciliation, this risk can also happen because the conveyor belt has not been in the position of adhering to the aircraft but the hydraulic has moved so that the officer on it can be squeezed.

Seventh, the improper position of body when pushing/moving and installing non motorized PBS, the wrong position when installing wheel chock and when moving goods during loading unloading activities and baggage reconciliation cause muscular problem and dislocation. This happens when the officer needs to move or shift or instal the PBS position, install wheel chock, or move goods during loading unloading activities and baggage reconciliation, but he does it with the wrong body position.

Eighth, the stair with rough and sharp iron may cause a scratch and injury. This happens when the officer checks the aircraft condition. The risk of being scratched by the rough and sharp iron exists in the activity of preparing PBS.

Ninth, being struck by operational vehicles and GSE causes minor to serious injury. This occurs because the officer is in the wide and open area while there are operational vehicles and GSEs that cross over and may strike the officer (who is not wearing a safety vest). The risk of being struck by operational vehicles and GSE exists in the activities of inspecting FOD, preparing WST and LST, preparing GSE, installing GPU and car air conditioner, installing safety cone, installing boarding stairs, loading-unloading and baggage reconciliation, refueling, water service and lavatory service activities.

Tenth, being splashed by dirty water from Lavatory Service Truck causes a contamination. This happens when the officer checks the tube of Lavatory Service Truck. The risk of being splashed by dirty water exists in the activity of Lavatory Service Truck.

Eleventh, being exposed to chemical materials causes a contamination. This happens while the officer is removing the waste or cleaning the tank; he may be exposed to the waste and the chemical material for neutralizing it. The risk of

being exposed to chemical materials exists in the activity of Lavatory Service Truck.

Twelfth, being run over by the aircraft tire while installing wheel chock causes minor to serious injury. This happens because the officer does not make a coordination with the technical officer, thus when the aircraft retreats and has not been in the position of fully stop the officer's foot is run over because of not wearing safety shoes. The risk of being run over by the aircraft tire exists in the activity of installing wheel chock.

Thirteenth, getting an electricity shock from GPU equipment and car air condiddtioner may cause minor to serious injury. This happens because the officer does not check the GPU condition while installing it. The risk of getting an electricity shock exists in the activity of installing GPU.

Fourteenth, being struck down by an object causes a bruise, hurt, injury and dislocation. This may happen because in the activities of loading-unloading and baggage reconciliation the position of baggage is higher than the officer's body and there are many baggages stacked over. The risk of being struck down by an object exists in the activities of loading-unloading and baggage reconciliation.

Fifteenth, being splashed by fuel may cause minor to moderate injury. If it splashes on our eyes, immediate medical assistance should be provided. This happens because the pipe is installed improperly or loosely. The risk of being splashed by fuel exists in the activity of refueling.

Sixteenth, being exposed to explosion may cause minor to serious injury. The most fatal, it can lead to death. The risk of being exposed to explosion exists in the activity of refueling.

2. Risk Evaluation on the Preparatory Activities before the Aircraft Arrival and Turnaround at Halim Perdanakusuma

Table 3 Matrix of Qualitative Risk Analysis – Level of Risk

Likelihood		***Consequence***				
		1	**2**	**3**	**4**	**5**
		Insignificant	***Minor***	***Moderate***	***Major***	***Catastrophic***
A	***Almost Certain***	**H**	**H**	**E**	**E**	**E**
B	***Likely***	**M**	**H**	**H**	**E**	**E**
C	***Possible***	**L**	**M**	**H**	**E**	**E**
D	***Unlikely***	**L**	**L**	**M**	**H**	**E**
E	***Rare***	**L**	**L**	**M**	**H**	**H**

Source: AS/NZS 4360:2004

The level of risks that are analyzed in each phase of activity is seen from three aspects exposed to detriment, namely:

- Toward the Worker

a. E = Extreme Risk/up to causing death
b. H = High Risk/causing permenanet disability/loss of fairly long working hours (from months up to years)
c. M = Moderate Risk/requiring medical care/loss of fairly long working hours (from weeks up to months)
d. L = Low Risk/requiring only first aids/loss of working hours (in days or it can be ignored)

- Toward the Company

a. E = the loss makes the company bankrupt
b. H = the company loses more than 100 million rupiah
c. M = the company loses more than 50 million rupiah
d. L = the company loses less than 10 million rupiah

From the above table, it can be concluded that the risks in the preparatory activities before the aircraft arrival and during on the ground fall into Extreme (E), High (H), and Moderate (M) levels. In the preparatory activity before the aircraft arrival, the level of risk is extreme (E) meaning that it may cause death during the preparation of aircraft parking due to noise hazard; in checking both motorized and non-motorized passengers boarding stairs, it is due to being lapsed then fall down and the noise of the aircraft machine; in preparing WST and LST, it is due to being struck by operational vehicles and the noise from aircraft; in checking or preparing GSE, it is due to the noise from aircraft and being struck by operational vehicles; in the activity of parking preparation, namely FOD inspection, it is due to the noise from the aircraft machine and being struck by operational vehicles; in the activity of aircraft—which happens while installing wheel chock—it is due to being run over by the airtcraft tire, being squeezed, and the noise from aircraft; in installing GPU in the aircraft, it is due to very loud sound of GPU machine and of the aircraft machine; in installing safety cone, it is due to the noise from the aircraft machine; in installing boarding stairs, it is due to falling down; in loading-unloading and baggage reconciliation activities, it is due to the aircraft machine; in refueling activity, it is due to falling down from the stair, the noise from the aircraft machine, and being exposed to explosion; in the water service and lavatory service, it is due to the noise from the aircraft machine; and in pushing back activity, it is due to being struck by GSE vehicle.

High (H) level means it may cause permanent disability or loss of fairly long working hours (from months up to years). H level of risk in preparing GSE exists in the activity of parking preparation due to fatigue or saturation; in checking both motorized and non-motorized passengers boarding stairs, it is due to being scratched

by rough and sharp stair iron as well as fatique or saturation; in the parking preparation, namely FOD inspection, it is due to fatigue or saturation; in WST and LST preparation, it is due to being splashed by dirty water as well as fatigue or saturation; in checking/preparing GSE, it is due to being squeezed as well as fatigue or saturation. In the activities when the aircraft is on the ground, the risk happens while parking the aircraft due to dust; in installing wheel chock, it is due to fatigue or saturation; in installing GPU in the aircraft, it is due to being struck by operational and other GSE vehicles as well as fatigue or saturation; in installing safety cone, it is due to fatique or saturation; in installing boarding stair, it is due to being squeezed, improper body position when pushing PBS to the right position as well as fatique or saturation. In loading-unloading and baggage reconciliation activities, it is due to being struck by other operational vehicles, squeezed, struck down by an object, improper body position when lifting/putting/moving goods as well as fatigue or saturation. In the water service and lavatory service, it is due to falling down as well as fatigue or saturation.

3. Risk Control in the Preparatory Activities Before the Aircraft Arrival and Turnaround

Some measures are needed to minimize the risks or hazards. In general, the risks can be minimized by reducing the potential consequences, reducing the occurence of perilous effects, and reducing the exposure to the risks. According to ICAO, there are two defenses in aviation that should be striven for in order to control risks, i.e. physical defense and administrative defense (Migration Control, www.skybrary.aero, March 2015).

The first, physical defense is a control over equipment and machinaries used. Based on the table of risk level, what PT Gapura Angkasa can do in ramp handling are maintaining and checking machines periodically, changing the machines when their performance has not been optimal anymore, making sure that the machines and equipment used have a safety standard set by the industry, and providing sufficient Personal Protective Equipment (PPE) for the workers of ramp handling. The second, administrative defense is a control through action or administrative management to minimize the hazards. What PT Gapura Angkasa can do are periodically evaluating the implementation of SOP, making a socialization about the risks and work health and safety (K3) to the workers of Ramp Handling, making a periodic report on the incidents and accidents, implementing punishment for any violation and reward for the employees who are disciplined in using PPE, and implementing an active caring behavior program in order that the behaviour of the workers of ramp handling is oriented to safety.

From the previous table, it seems that after a migration control has been done, thus in the activity of preparing equipment and turnaround, the level of risk can be lowered. The highest level become high

(H), i.e. the noise from aircraft. Meanwhile, in the activity of checking motorized and non-motorized passengers boarding stairs, the high risk is being lapsed and falling down and the noise from aircraft. In the FOD inspection, the high risks are the noise from aircraft and being struck by operational and GSE vehicles. Whereas in preparing WST and LST the high risks are being struck by operational vehicles and the noise from aircraft. In checking and preparing GSE, the highest risks are being struck by operational vehicles and the noise from aircraft. In parking the aircraft as well as in installing wheel chock, the highest level of risk is in the noise of aircraft machine. In installing Ground Power Unit in the aircraft, the highest risks are the noise from the loud sound of GPU machine as well as the noise from aircraft machine. The highest risk in installing safety cone is the noise from aircraft machine. In installing boarding stairs, the highest risks are falling down and the noise from aircraft machine. In loading-unloading and baggage reconciliation, the highest risk is the noise from aircraft machine. Refueling activity has the highest risks of the noise from aircraft machine and being exposed to explosion. The last, in the water service and lavatory service activities, the highest risk is also the noise from aircraft machine.

Conclusion

Every phase in the activities of preparing equipment and turnaround has its own risks. Checking and preparing GSE have the highest risks of being struck by operational vehicles and the noise from aircraft. In the aircraft parking, the highest level of risk is the noise from aircraft machine. Likewise in the wheel chock installation, the highest risk is the noise from aircraft machine. In installing Ground Power Unit in the aircraft, the highest risks are the noise from the loud sound of GPU machine as well as the noise from aircraft machine. In installing safety cone, the highest risk is the noise from aircraft machine.

The levels of risks are extreme, high, and moderate. After migration control has been done in the form of physical defense and administrative defense, the levels of risks in the activities of preparing aircraft and turnaround can be lowered to become high, moderate and low. The activities of ramp handling should pay attention to the aspect of Work Health and Safety (K3), Risk Management, and Ground Handling.

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